



# Thoughts on exciting directions to explore towards improving prediction skill of precipitation

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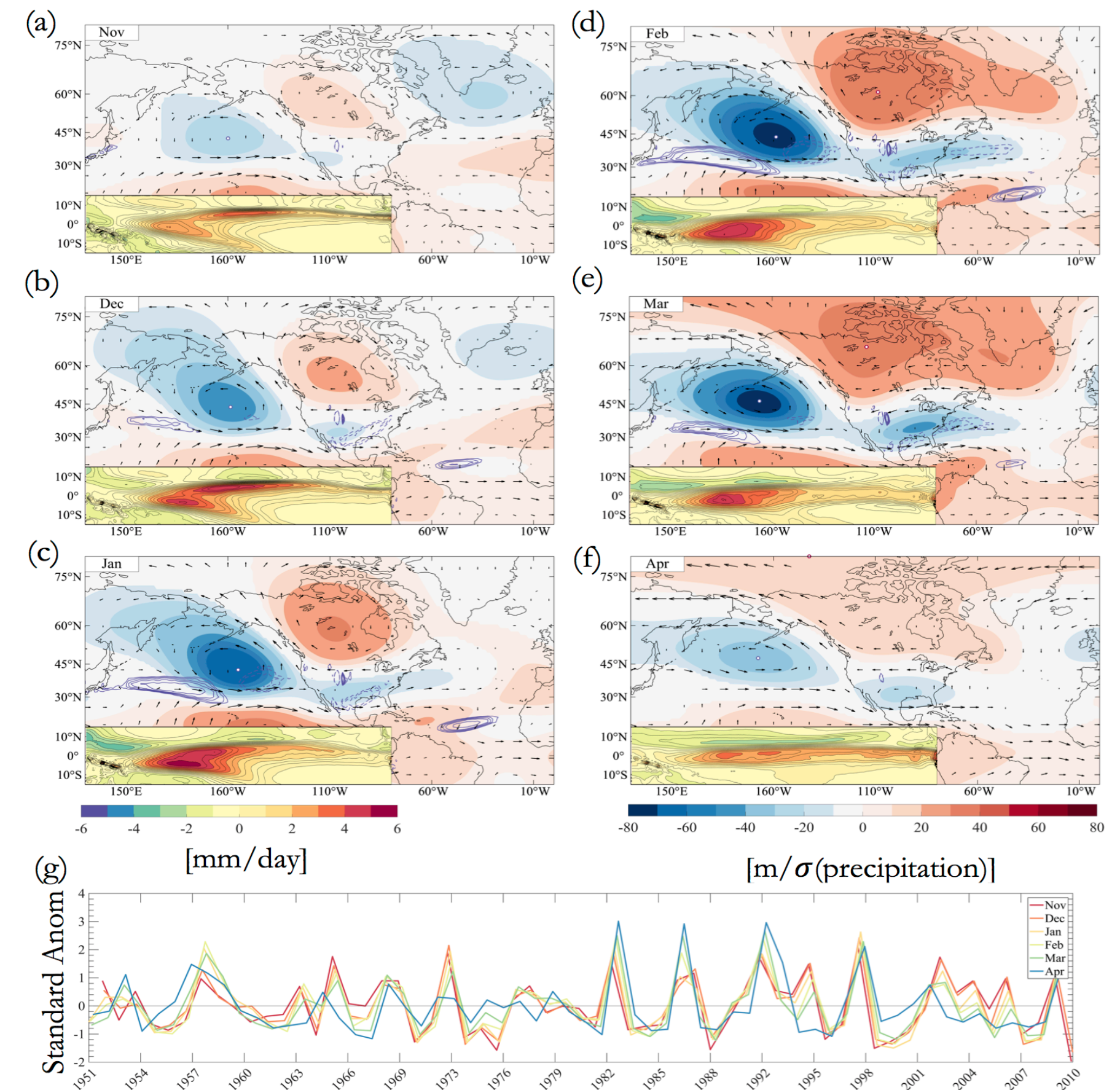


# Intraseasonal Modulation of ENSO Teleconnections: Implications for Predictability in North America

Will Chapman, Aneesh Subramanian, Shang-Ping Xie, Marty Ralph, Michael D. Sierks, Youichi Kamae (J. Clim. sub judice)

- By utilizing a large ensemble of an atmospheric general circulation model, this study reveals the pronounced subseasonal evolution, at a monthly resolution, of both the ENSO forcing signal and internal variability.
- March, of El Niño years, has the highest Signal-to-Noise ratio (more predictability). (Followed closely by February), in 200mb Geopotential Height, 2m Temperature, and Precipitation.
- We observe a  $\sim 10\%$  drop (increase) in Internal Variability in El Niño (La Niña) years.

**Can high S/N events in large climate ensembles  
be translated to  
improved prediction in initialized forecasts?**



Monthly Regression of GPH 200mb (colorfill), UV winds 200mb (vectors), Rossby Wave Source (purple contour), on leading Principle component of Tropical Precipitation (EOF Pattern is inset).

We see a strong forced response in late winter/early spring.



# Coupled atmosphere-wave-ocean-land interactions can influence precipitation drivers



## Investigating atmosphere–ocean–wave interactions and mesoscale features in atmospheric river events using a regional coupled model

R. Sun<sup>1,2</sup>, A. Subramanian<sup>1,2</sup>, B. D. Cornuelle<sup>1,2</sup>, I. Hoteit<sup>3</sup>, M. Mazloff<sup>1</sup>, A. J. Miller<sup>1</sup>, F. M. Ralph<sup>1,2</sup>, H. Seo<sup>4</sup>



Ocean coupling helped improve Atmospheric river forecasts when mean SST was cool

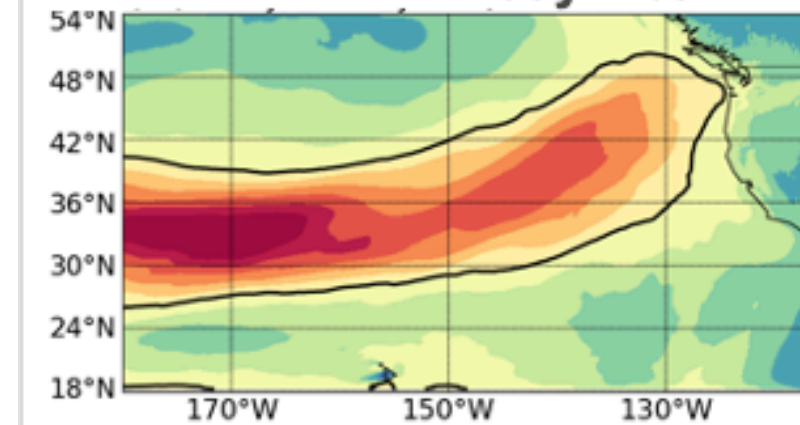
Exciting new project: Earthworks aims to run all component models on a single enormous grid



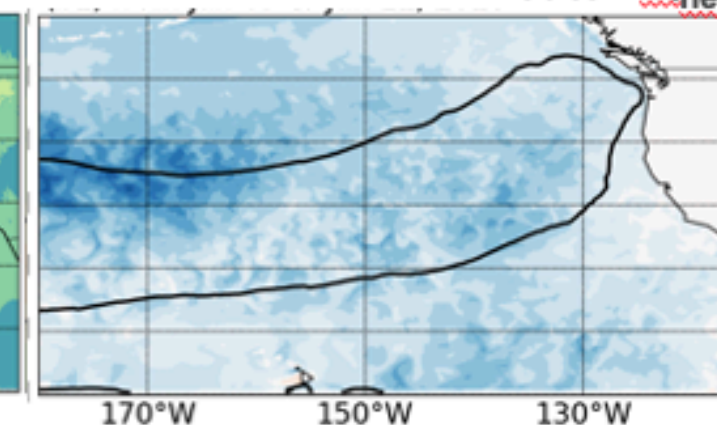
Earthworks  
Global Storm Resolving Model

## Can improved coupling across components increase prediction skill?

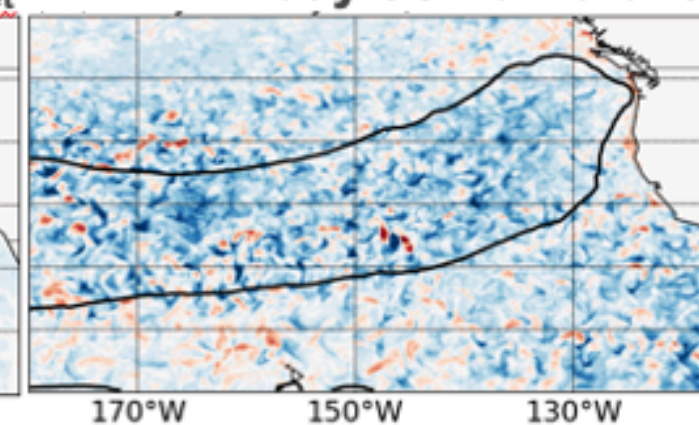
**Case1, strong cooling AR, Jan 07 to Jan 21, 2018**  
14-day mean IVT



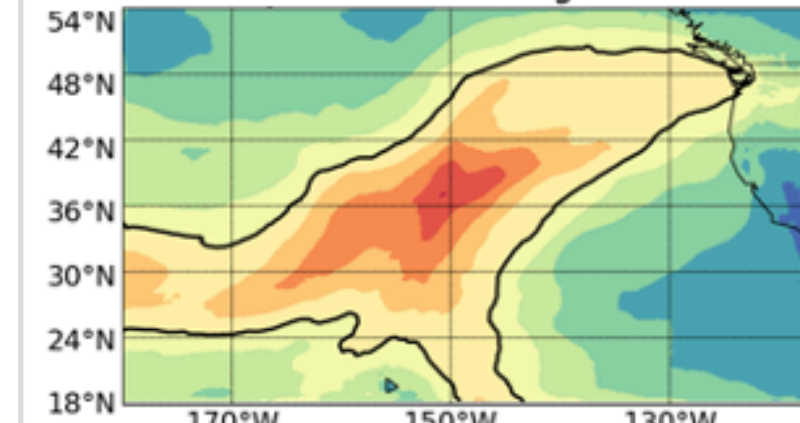
total  $Q_{net}$



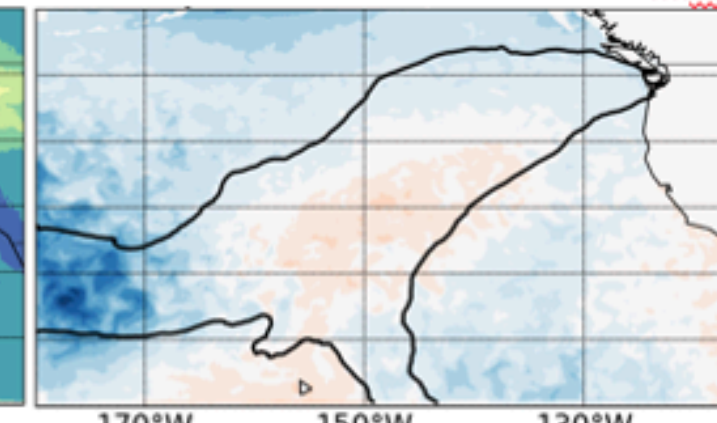
14-day SST difference



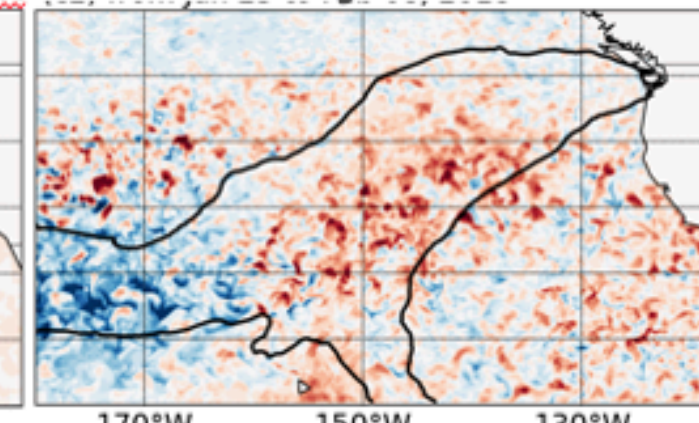
**Case2, weak cooling AR, Jan 25 to Feb 08, 2018**  
14-day mean IVT



total  $Q_{net}$

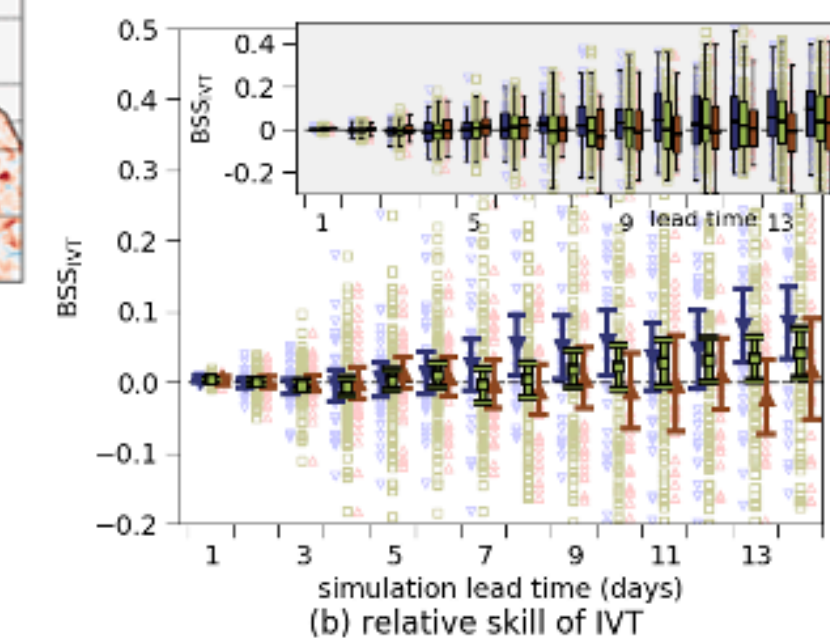
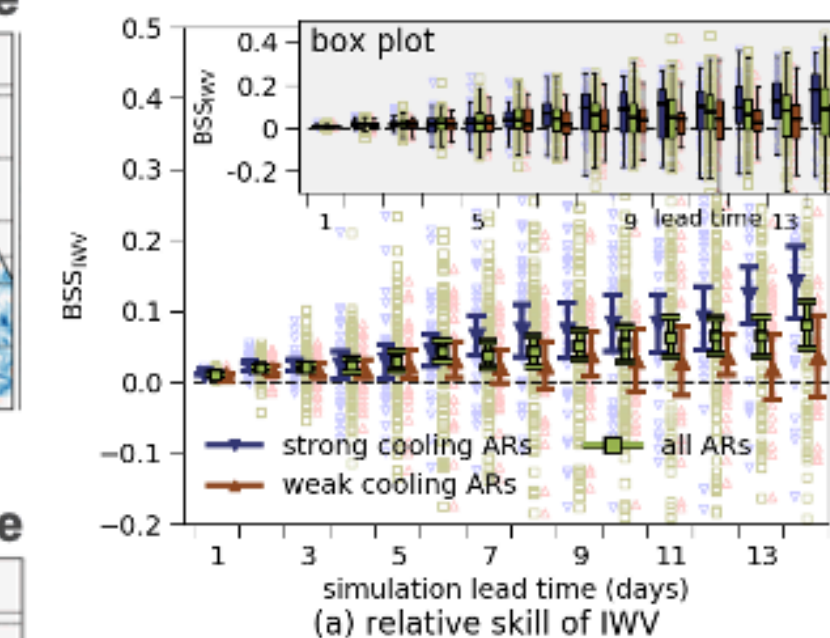


14-day SST difference



We use the Scripps–KAUST Regional Integrated Prediction System (SKRIPS) modeling framework available at [https://github.com/iurnus/scripps\\_kaust\\_model](https://github.com/iurnus/scripps_kaust_model)

Comparison of the skill



### ARTICLE

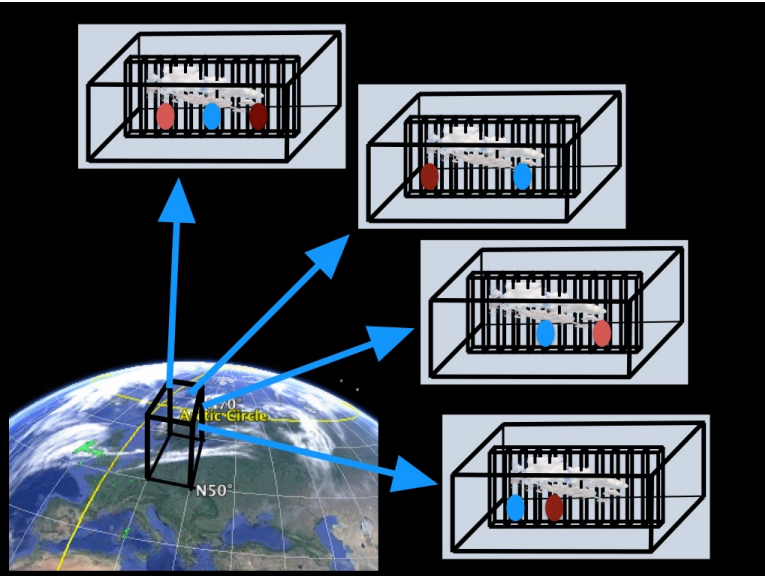
## Ocean Fronts and Eddies Remotely Forcing Atmospheric Rivers and Heavy Precipitation

> Xue Liu, Xiaohui Ma, Ping Chang, Yinglai Jia, Dan Fu, Guangzhi Xu, Lixin Wu, R. Saravanan, Christina Patricola

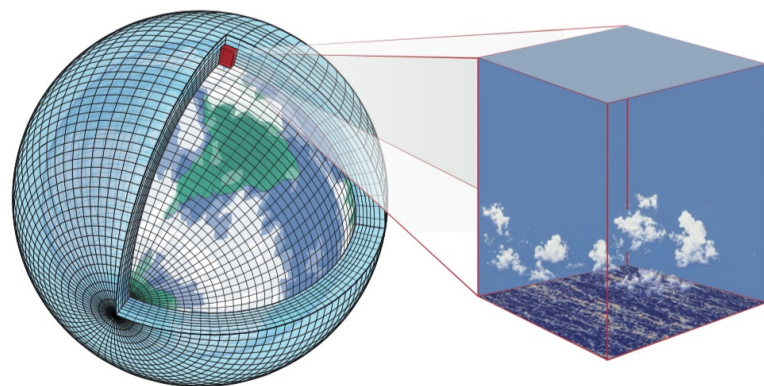
DOI: [10.21203/rs.3.rs-82364/v1](https://doi.org/10.21203/rs.3.rs-82364/v1) [Download PDF](#)



# Innovations in Modeling, Computing, Observations, Data Assimilation needed!



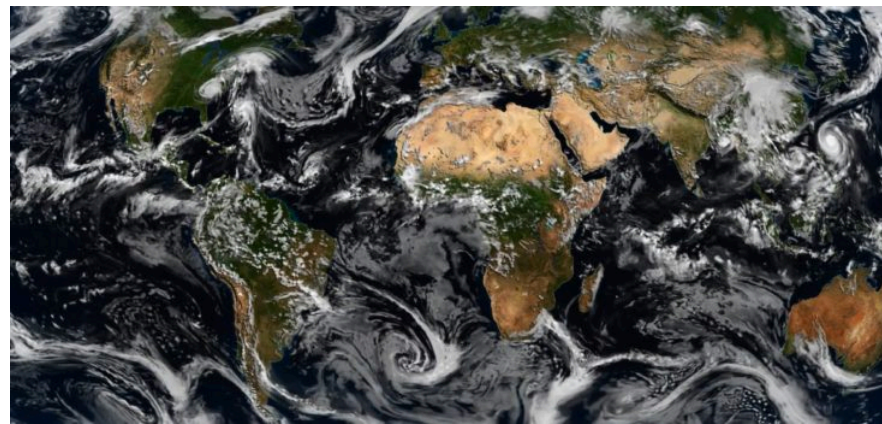
Innovate stochastic parameterization and uncertainty representation



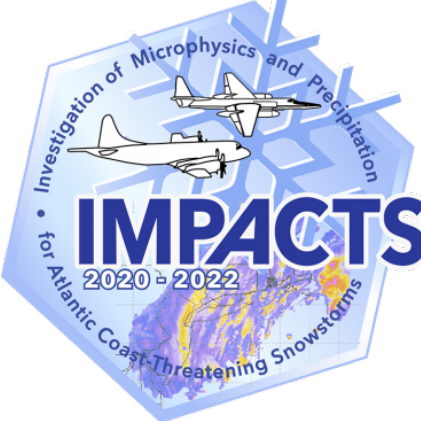
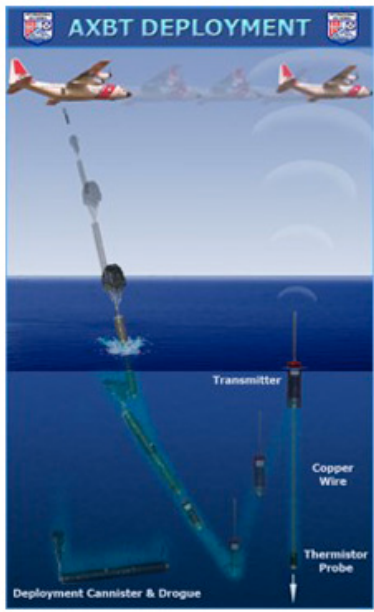
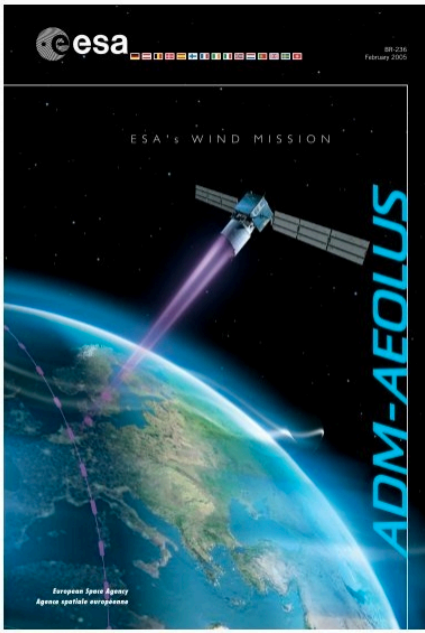
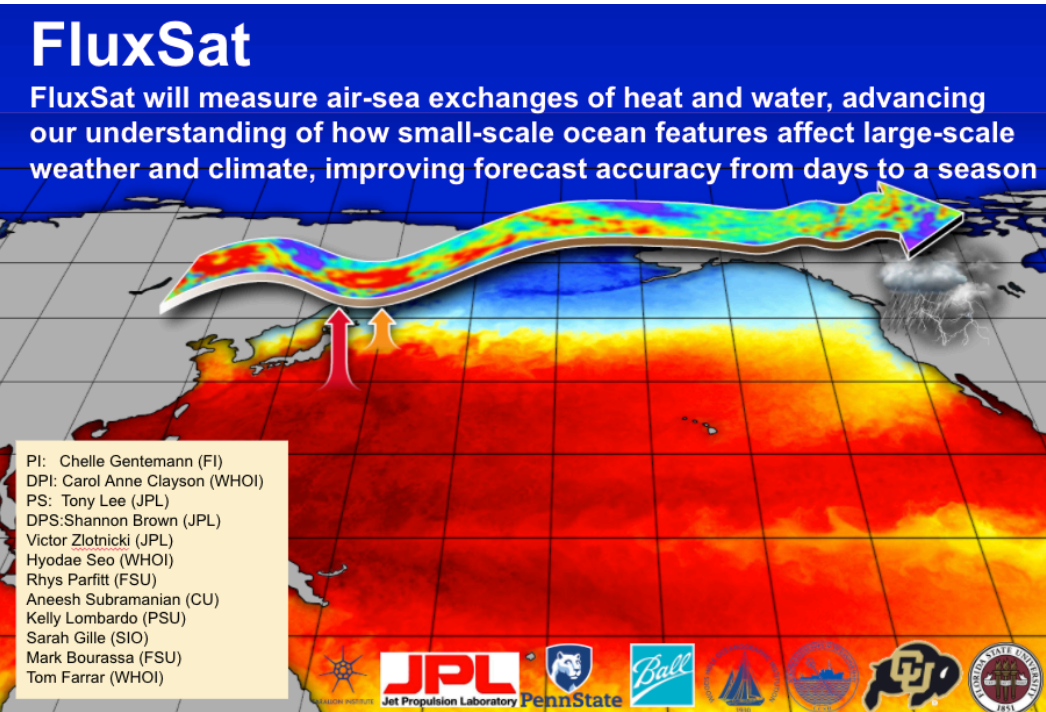
Innovate subgrid scale parameterization



Innovate Coupled Modeling



Innovate regional downscaling (e.g. FV3)



HOME > HPC > Fugaku Remakes Exascale Computing In Its Own Image

## FUGAKU REMAKES EXASCALE COMPUTING IN ITS OWN IMAGE

December 9, 2019 Michael Feldman



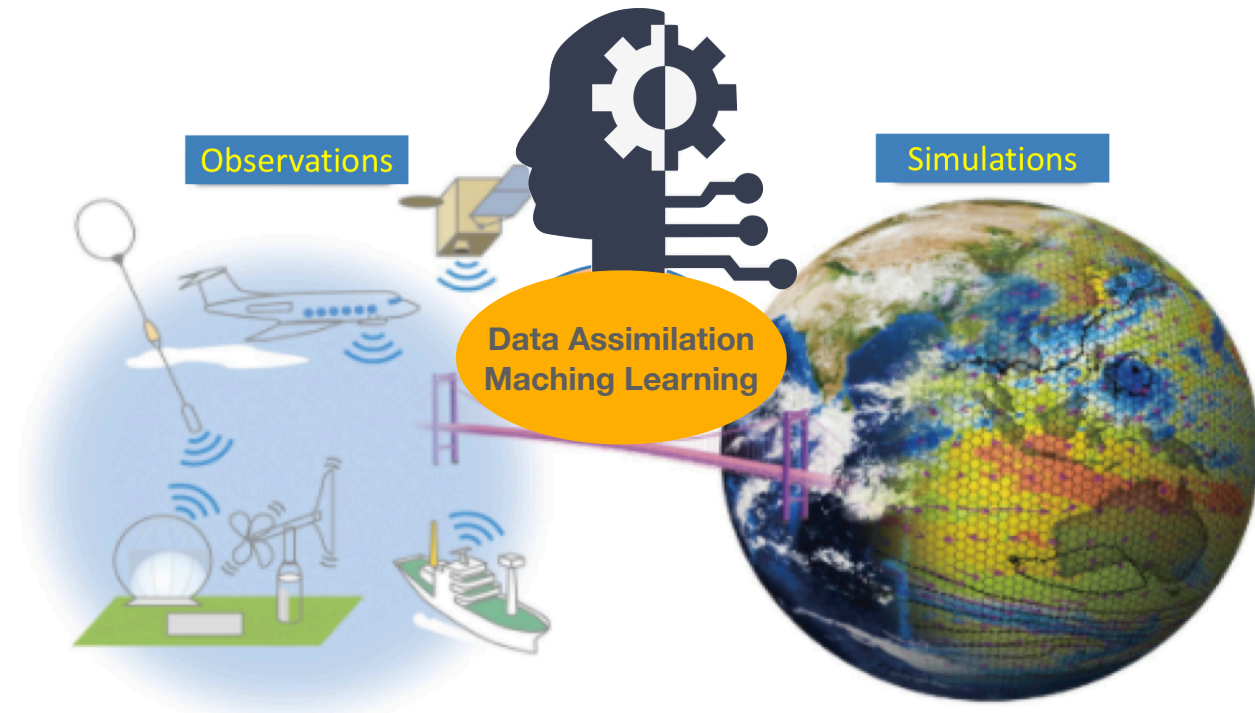
ECMWF @ECMWF · Nov 23

This week we finalised an agreement with @RIKEN\_RCCS in Japan, the home of the world's fastest supercomputer, #Fugaku. This will foster collaboration between Europe and Japan towards running high-resolution Earth-system models on the next generation of #supercomputers.

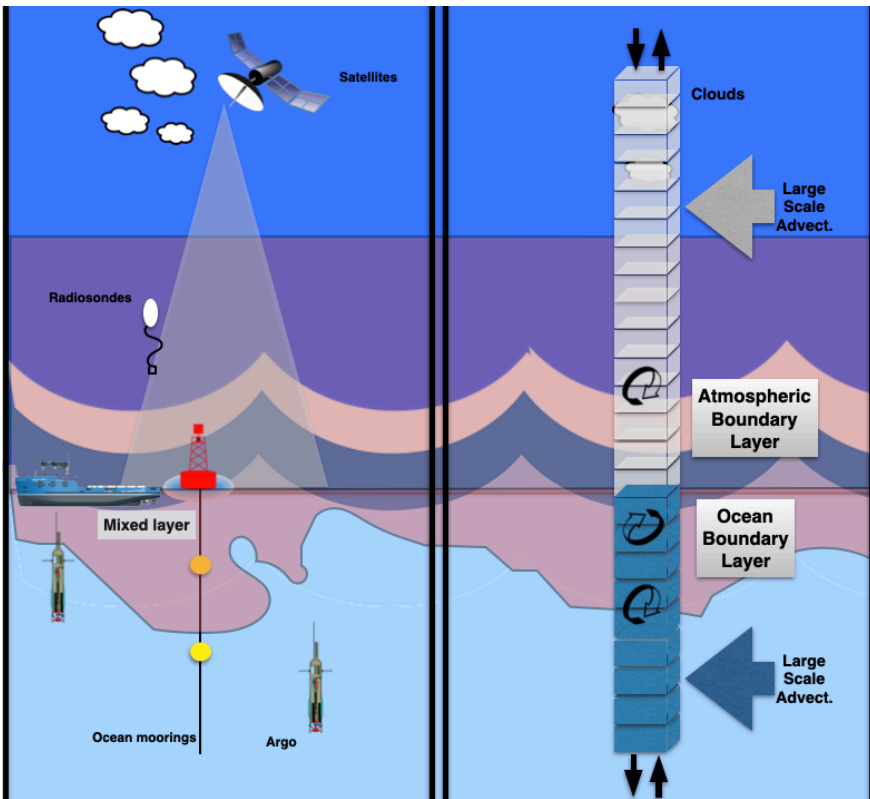


European Weather Forecasting Center has an agreement with them to develop weather and climate forecasts on their system with mixed precision

Use of Machine Learning and Data Assimilation to optimize the use of observations further



Coupled Data Assimilation





Three upcoming Workshops / Summer Schools to continue conversations



**NCAR** | ADVANCED STUDY PROGRAM

## 2021 ASP Summer Colloquium

~~July 6-24, 2020~~

### THE SCIENCE OF SUBSEASONAL TO SEASONAL (S2S) PREDICTIONS

Scientific Leads: Judith Berner (NCAR), Aneesh Subramanian (CU Boulder)

The ASP Summer Colloquium is intended to bring experts from academia and weather prediction centers together with graduate students and early-career scientists to discuss predictions on the subseasonal to seasonal timescale. S2S science bridges the prediction gap between weather and climate and forecasts on this timescale are highly sought after by the energy sector, agriculture, water management and other sectors.

The Colloquium will be held at the **National Center for Atmospheric Research** in Boulder, CO.

A scientific workshop will take place July 13-17, 2020, as part of the Colloquium. Invited speakers will present the latest results and challenges in this fast moving field.

This colloquium is intended for advanced graduate students whose expertise includes atmospheric, Earth system prediction and adjacent sciences. It will feature lectures on the fundamental processes leading to S2S predictability such as the Madden-Julian Oscillation, sudden stratospheric warmings, and interactions with the land and cryosphere. In practical sessions, S2S forecasts will be analyzed.

ASP will fund travel and living expenses for 25 student participants to attend the Colloquium.

For more information about the Advanced Study Program and the 2020 Summer Colloquium, see our website: <https://asp.ucar.edu/asp-colloquia>



**NCAR** | NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

## Workshop on Subseasonal to Seasonal (S2S) Science and Predictions

~~July 13-17, 2020~~

### NCAR Mesa Lab, Boulder, Colorado, USA

S2S science bridges the prediction gap between weather and climate, and forecasts on this timescale are highly sought after by the energy sector, agriculture, water management and other sectors.

During the workshop, domestic and international experts will report on the latest results and challenges in this fast moving field.

The topics will range from fundamental processes such as the Madden-Julian Oscillation, sudden stratospheric warmings, and land and cryosphere interactions, as well as topics related to practical S2S prediction such as ensemble forecasting,

initialization strategies, emerging tools and applications to stakeholders.

The workshop will be held at the National Center for Atmospheric Research in Boulder, CO and is part of the 2020 ASP summer colloquium, which will be attended by graduate students and post-docs.

For registration information and more information on the ASP summer colloquium, see our webpage: <https://asp.ucar.edu/asp-colloquia>

Due to space limitations only a limited number of contributions can be accepted.



SAVE THE DATE!

# TROPICAL PACIFIC OBSERVING NEEDS WORKSHOP

May 24-26, 2021 | Boulder, Colorado and/or Virtual

A workshop to gather community input on the types of observations of the ocean and atmosphere in the Tropical Pacific needed to advance our understanding of poorly observed subgrid-scale processes and to initiate discussions of how such observations could be leveraged to improve satellite retrievals, data assimilation, and parameterized processes in climate, forecast, and biogeochemical models.

#### Scientific Organizing Committee:

**Charlotte DeMott**, Colorado State University (co-chair)

**Aneesh Subramanian**, University of Colorado (co-chair)

**Shuyi Chen**, University of Washington

**Kyla Drushka**, University of Washington

**Yosuke Fujii**, JMA/MRI

**Adrienne Sutton**, NOAA PMEL

**Janet Sprintall**, Scripps Institution of Oceanography

**Dongxiao Zhang**, NOAA PMEL

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